

REMARKS

Interview Summary

Applicant gratefully acknowledges the courtesy of Examiner Stein in granting a personal interview on October 6, 2005. Applicant concurs with the Examiner Summary of October 6, 2005, and adds the following observations:

The undersigned attorney argued that Claim 1, particularly as currently amended, distinguished over US Patent 5,579,429 to Naum, and that the rejection of Claims 1 and 2 over Naum and US Patent 6,536,993 to Imamura et al. should be withdrawn. This was because Naum fails to teach or suggest a density gradient in light-scattering means along the longitudinal axis of a light pipe. Examiner Stein did not state that Claims 1 and 2 were allowable over the prior art in general, but did agree that Claim 1, if rewritten as presently amended, would distinguish over Naum, and obviate the basis for the foregoing rejection.

Typographical

Claims 1 and 18 have been amended in minor respects to further specify the presence (or absence) of a gradient of density of light-scattering material *along a longitudinal axis* of a light pipe or active section of light pipe. In Claim 1, the words "along the core" have been deleted as unnecessary. Similarly, in Claim 18, the words "in the core" have been deleted as unnecessary. The foregoing changes are merely typographical in nature.

Claims 3-7

Claims 3-6 stand rejected under 35 USC 103(a) as obvious over Imamura et al. and EP 0 841 151 to Abramowicz et al.; and Claim 7 stands rejected over the foregoing reference and further in view of Naum. Applicant submits that these rejections are overcome by the present amendment to Claim 3.

The amendment to Claim 3 deletes reference to light-scattering material being distributed in the cladding, to which the Imamura et al. and Abramowicz references relate. With Claim 3 being only directed to light-scattering material being distributed in the core of a light pipe, the foregoing references fail to support a *prima facie* case of obviousness of Claim 3. So, Claim 3 and dependent Claims 4-7 should be held allowable.

Dependent Claims 4-7 recite additional features of the invention so as to distinguish with even more force over the prior art. For instance, the recitation in Claim 4 of the radial swath being less than about 180 degrees prevents repeated reflection of a light ray in a light pipe where the light-scattering particles have a high reflectance component. That is, if a radial swath

exceeds about 180 degrees, a light ray reflecting from a radial edge of a light-scattering means will have a high probability of striking another portion of the light-scattering means, causing a further reflection of the light ray. Repeated reflection would result in loss of light.

Thus, Claim 4 distinguishes over the prior art with even greater force than base Claim 3.

Claim 7, which was additionally rejected over Naum, quantitatively recites a level of uniformity of lumen output along the length of a side-lighting emitting portion of a light pipe. Although Naum mentions the feature of “light to escape uniformly along its [i.e., the light pipe’s] length” (Col. 3, Lines 31-35), such mention of uniform light emission is not stated quantitatively, so it would not be interpreted by a person of ordinary skill in the art as 100 percent uniformity. In fact, Naum himself states three paragraphs later that light is emitted “*substantially* evenly along its [i.e., the light pipe’s] length” (Col. 3, Lines 48-55; emphasis added). Naum does not quantify what he means by “substantially.” So, a person of ordinary skill in the art would not be motivated to provide the level of uniformity specified in Claim 7.

Thus, Claim 7 distinguishes over the prior art with even greater force than base Claim 3.

Claims 18-22

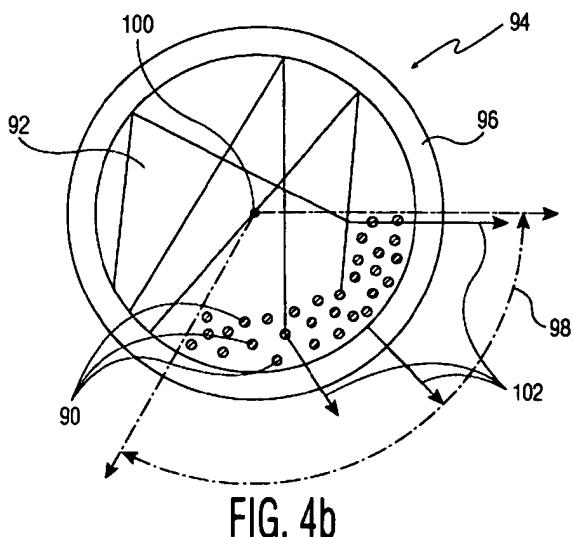
Claims 18-22 were objected to as being dependent on a rejected base claim. However, it is submitted that the base claim (Claim 3), as amended, is patentable. So, Claims 18-22 should be allowed.

Claims 23-29

Claims 23-29 were allowed. Nevertheless, the phrase in Claim 23 (and in Claims 3 and 18) of “light preferentially exits the light pipe from the radial swath” has been amended to read: “light exits the light pipe in a directional manner,” as stated at Page 2, Lines 25-26 of the Specification. As will be seen from the following discussion, the deleted phrase is accurate and clear, but it is believed that the substituted phrase will have even more immediate clarity.

“Light exits the light pipe from the radial swath”

All light that is deflected to more than the acceptance angle of the claimed light pipe, due to striking a radial swath of light-scattering material, does indeed exit the light pipe from the radial swath. This is explained in connection with Fig. 4b of the present application, reproduced as follows:



As shown in Fig. 4b, light rays 102 strike light-scattering material 90 in a radial swath 98 of core 92 of light pipe 94 and are transmitted in the direction shown. All light rays striking light-scattering material 90, and being deflected at above the acceptance angle of the light pipe, exit from the radial swatch *through* the light pipe, which includes cladding 96. In more detail, all light rays pass through the cladding portion of the light pipe, and, if the deflecting light-scattering material is embedded some distance within the core, will also pass through some portion of the core.

Light-scattering particles can be of several types

Light-scattering material can be “refractive-type material or reflective-type material or both,” as stated in the Specification at Page 5, Lines 16-17. A person of ordinary skill in the art will recognize that, in Fig. 4b above, light-scattering material 90 is mainly of the refractive type. That is, light will transit through light-scattering material of the refractive type, although with some refractive change of direction, and exit such as shown by the arrows on light rays 102.

If, however, light-scattering material 90 were instead embodied as material with a large reflective component, then the arrows of light rays 102 would point in a substantially opposite direction than the arrows as currently shown.

The foregoing principles of physics would be readily apparent to a person of ordinary skill in the art based on the present specification.

Clarification of comments by Examiner

The above discussions of the physics of light rays striking different types of light-scattering material (e.g., refractive-type, reflective-type or both) has been included to clarify the

record concerning the direction of emission of light by the light-scattering means. The above discussions seek to clarify, for instance, the discussion at Lines 4-6 on Page 4 of the Office Action dated July 20, 2005.

As mentioned above, a person of ordinary skill in the art will realize that the angles of light rays (e.g., 102, Fig. 4b) will depend on the degree of refractive versus reflective type of light-scattering material used.

Comments on newly-cited references

US Patent 6,278,827 to Sugiyama et al. discloses in connection with Fig. 2, for instance, that a "light-reflecting layer 4 is formed *on the outer surface* of the core section 2 in a manner that it invades slightly from said surface into the inner portions thereof." Col. 10, Lines 61-64; emphasis added. Thus, Sugiyama et al.'s light-reflecting layer 4 is positioned "on" the core. All pending claims distinguish over Sugiyama et al., since all base claims recite light-scattering material being distributed *in the core*—not "on" the core as in Sugiyama et al.

US Patent 6,621,973 to Hoffman discloses a hollow light guide, and, as such, is believed not to detract from the patentability of the present claims.

Conclusion

Allowance of the pending claims is earnestly solicited.

I certify that the foregoing document and any document(s) referenced below are being mailed by first-class mail, postage-prepaid, to the address stated above on the date stated below.

Dated: October 18, 2005

Respectfully submitted,


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